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Cognitive appraisal as a mediator in the relationship between stress and burnout

Abstract

The relation between job stressors and burnout is well established in the literature. However, the mechanisms behind this relationship are still not clear. Thus, this study has the main goal of analysing the mediating role of cognitive appraisal on the relation between occupational stress and burnout. To test this relation, structural equation modelling was used in a sample of teachers (N=333) working at a public university in the north of Portugal. The participants answered a protocol with measures that included the level of stress on academic staff, cognitive appraisal of their work activity, and a burnout inventory for educators. The results indicated distinct sources of stress on their work activity and a relation between stress, cognitive appraisal, and burnout. Most importantly, the results confirmed that primary and secondary cognitive appraisals partially mediated the relationship between occupational stress and burnout at work, making these variables a promising underlying mechanism for explaining adaptation at work.

Keywords: Occupational stress; Cognitive appraisal; Burnout; Teachers.

Introduction

The study of occupational stress in teaching, that includes college teachers, represents a topic of great interest in research, existing evidence that academics face a changing context with several sources of stress, such as substantial growth in student numbers, an emphasis on research and publishing, low salaries compared with other professionals with similar educational backgrounds, higher numbers of untenured contracts, workload, a lack of opportunity for career advancement, and a need to obtain and attract external funding (Jacobs, Tytherleigh, Webb, & Cooper, 2007; Winefield et al., 2003). These stressors suggest that academia is a context with higher stress levels than those found in normative data from the general population (Tytherleigh, Webb, Cooper, & Ricketts, 2005).

The higher level of occupational stress found in teaching requires research not only to analyse potential sources of stress that may be problematic for teachers, but also devoting attention to how these potentially stressful conditions are influenced by teachers' appraisals and how they may produce strain and disease (Dewe, O'Driscoll, & Cooper, 2010). Lazarus and Cohen-Charash (2001, p. 46) argued, "It is not the person or the work environment alone that is responsible for stress and distress in organisational settings, but the functional juxtaposition of both".

Therefore, the objective of this study was to examine the mediating influence of teachers' cognitive appraisals on the relation between occupational stress (antecedent variable) and burnout (consequent variable) using the cognitive-motivational-relational approach of Lazarus (1991; Lazarus & Folkman, 1984) as the main conceptual framework. In his transactional proposal, Lazarus (1991) conceptualised stress as a complex subjective phenomenon with multivariate processes that result from a broad system of variables involving inputs, outputs, and the mediating activities of appraisal and coping (Lazarus, DeLongis, Folkman, & Gruen, 1985). The stress process is dynamic and changes constantly

according to the relationship between a person and the environment. These changes are influenced by the processes of cognitive appraisal, which represent evaluations of the situations that have consequences for an individual's beliefs, values and/or goals (Lazarus & Folkman, 1984).

Cognitive appraisal processes are very important for understanding human adaptation to stressful situations because the experience of stress and strain depends on the way that an individual evaluates a situation and his or her personal coping resources. Thus, during a stressful event, two cognitive processes become crucial to understanding the actions and emotional states of an individual: primary cognitive appraisal, which involves evaluating the personal significance of a situation, and secondary cognitive appraisal, which involves evaluating the personal ability to cope with stressors (Lazarus, 1991). During primary cognitive appraisal, the person-environment relationship can be perceived by the individual as harmful, threatening, or challenging. The harm appraisal tends to be accompanied by negative emotions such as sadness or anger, whereas the threat appraisal tends to be accompanied by negative emotions such as anxiety or fear. In contrast, the challenge appraisal tends to be accompanied by positive emotions such as excitement, eagerness, and confidence (Folkman, 2008). Two of these dimensions (i.e., threat and challenge perceptions) were evaluated in the current study. With regard to secondary cognitive appraisal, this study included the following two related measures: coping potential, which evaluates the extent to which an individual feels able to cope with the demands of a work activity, and control perception, which evaluates the extent to which an individual feels powerful enough to address the demands of a work activity. Coping potential and control perception are important variables for explaining reactions to stressful situations both from a theoretical (Karasek, 1979; Lazarus, 1991) and an empirical point of view (de Lange, Taris, Kompier, Houtman, & Bongers, 2003).

The relationship between occupational stress and cognitive appraisal was complemented in this study by including a measure of burnout. This variable was selected because it represents a well-known strain of occupational stress. Burnout is defined as “a prolonged response to chronic emotional and interpersonal stressors on the job and is represented by three dimensions: (a) exhaustion that refers to the feelings of being overextended and depleted of one’s emotional and physical resources; (b) cynicism (or depersonalisation) that refers to the negative, callous, or excessively detached response to various aspects of the job; and (c) lack of accomplishment that refers to the feelings of incompetence and a lack of achievement and productivity at work” (Maslach, Schaufeli, & Leiter, 2001, p. 397). Another factor that justified the inclusion of burnout in this study was evidence that burnout rates are increasing in the teaching field, which produces negative and inappropriate attitudes and responses towards students, a loss of idealism at work, and a desire to leave the profession (Halbesleben & Buckley, 2004; Moya-Albiol, Serrano, & Salvador, 2010). Despite considerable data regarding the effects of burnout on individuals, previous research lacks a theoretical framework to guide empirical studies (Guglielmi & Tatrow, 1998) of the relationship between environmental stressors and teachers’ health consequences (Evers, Tomic, & Brouwers, 2004). It is interesting to note that several studies have analysed the factors that contribute to the experience of burnout in teachers, including the school environment (Goddard, O'Brien, & Goddard, 2006), the teachers' feelings of belonging (Skaalvik & Skaalvik, 2011), the teachers’ competence in coping with students’ disruptive behaviours (Evers et al., 2004), the teachers’ perceptions of personal resources, and the teachers’ satisfaction with regard to basic needs (Boudrias et al., 2011). However, less attention has been given to the influence of the processes of cognitive appraisal on the relation between stress and burnout. This omission is somewhat disconcerting given that these processes can have a substantial effect on human adaptation to stressful situations. According to Lazarus and Folkman (1984), the impact of a

stressor on an individual's well-being is only evident when the environmental demands are perceived as exceeding, taxing, or threatening to his or her adaptive resources. Therefore, the current study investigated whether processes of cognitive appraisal mediated the relation between stress and burnout according to the conceptual framework of Lazarus' (1991) transactional model. Considering all of these ideas, seven hypotheses were posited in this study.

The first hypothesis stated that stress was positively related to burnout. In this study, occupational stress was defined as the overall set of demands that teachers must face regarding their activities, and burnout was defined as the psychological strain that results from exposure to stressful situations. This stressor-strain relationship has been supported by important theoretical frameworks (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; French, Caplan, & Harrison, 1982; Kahn & Byosiene, 1992; Karasek & Theorell, 1990) and by empirical findings that demonstrate the relationship between stress and burnout (Hakanen, Bakker, & Schaufeli, 2006).

The remaining six hypotheses formulated for this study were based on the relationship between stress, cognitive appraisal, and burnout. In this way, the second and third hypotheses stated a relation between stress and cognitive appraisal. More specifically, the second hypothesis suggested that stress was related to primary cognitive appraisal, both positively (e.g., threat perception) and negatively (e.g., challenge perception). The third hypothesis indicated that stress was negatively related to secondary cognitive appraisal (e.g., coping potential and control perception). The fourth and fifth hypotheses suggested that cognitive appraisal was also related to burnout. Thus, the fourth hypothesis posited that primary cognitive appraisal was positively (e.g., threat perception) and negatively (e.g., challenge perception) related to burnout. The fifth hypothesis proposed that secondary cognitive appraisal (e.g., coping potential and control perception) was negatively related to burnout.

There is a lack of studies that tested these four hypotheses. However, there is evidence that primary cognitive appraisal (e.g., threat and challenge perceptions) has differential effects on individuals. For example, threat perception tends to be related to negative consequences, including low coping expectancies and anxiety (Lazarus & Folkman, 1984; Sarason & Sarason, 1990; Skinner & Brewer, 1999), whereas challenge perceptions tend to be related to positive consequences, including enjoyment due to the efficacy associated with overcoming difficulties and excitement in anticipation of personal benefits (Lazarus & Folkman, 1984; Lazarus, Kanner, & Folkman, 1980). Regarding secondary cognitive appraisal, there is also some evidence for the importance of coping potential and control perception on the way people respond to stress. In the case of coping potential, differences in how people cope with work demands affect the outcomes of the stress experience (Mearns & Cain, 2003), with the assumption that more coping resources mitigate the strain produced by work stressors (Pithers, 1995). In the case of job control, there are also some theoretical indications about its impact on occupational stress and burnout. For example, the Job-Demand-Control-Support (JDC-S) model proposed that individuals with high job demands, low control, and low social support are at risk for psychological and physiological strain, including burnout (Karasek & Theorell, 1990). Additionally, Hobfoll's Conservation of Resources (COR) theory proposed a relationship between work demands, job control, and social support, which affects burnout (Hobfoll & Shirom, 2000). When work demands exceed employee resources (e.g., job control), stress may occur (Freedy & Hobfoll, 1994). Furthermore, when individuals are exposed to prolonged stress and cannot allocate or invest new resources, then stress may eventually lead to burnout (Halbesleben, 2006).

Finally, the main goal of this study was examined according to two hypotheses that tested the mediating effect of cognitive appraisal on the relation between stress and burnout. More specifically, the sixth hypothesis posited that primary cognitive appraisal mediates the

relationship between occupational stress and burnout and the seventh hypothesis argued that secondary cognitive appraisal mediates the relation between occupational stress and burnout. To the best of our knowledge, this is the first study to test these specific mediating relations. However, there is evidence that other variables, such as intrinsic motivation, mediate this relationship (see Rubino, Luksyte, Perry, & Volpone, 2009). Therefore, the inclusion of other variables in the study of the relationship between stress and strain makes theoretical and empirical sense.

Method

Participants

The sample selected for this study was a convenience one, being all the participants working in a public university in the north of Portugal. The sample consisted of 333 teachers, with 129 males (39.9%) and 194 females (60.1%) (ten participants did not provide information on their gender). Participants' ages varied between 23 and 65 years old ($M = 42.67$; $SD = 6.87$). The sample consisted of 4.2% lecturers, 10.5% assistants, 62.6% assistant professors, 18.9% associate professors, and 3.8% full professors. Most of the teachers had full-time contracts with the university (90.6%) and had tenured contracts (58.7%).

Procedure

This study was conducted in accordance with the internal guidelines of the Research Centre of Psychology for our university and conformed to both national and European regulations regarding research with human participants and the management of personal data. We started by contacting the directors of each school, institute, and department of the university and explaining the goals of the procedures for data collection. After obtaining their agreement, teachers were contacted to explain the study goals and were informed that participation was

anonymous and confidential. Data collection occurred at two time points. At the first time point, the questionnaires were distributed to the teachers to take home and complete. At the second time point, the questionnaires were collected. Informed consent was obtained for all of the teachers who agreed to participate in the study. All of the participants who wanted information regarding their results were asked to provide their names and addresses for further contact. Altogether, 893 questionnaires were distributed, and 333 were collected and considered valid for a return rate of 37.3%.

Measures

Demographic Questionnaire. This questionnaire assessed the personal (e.g., age and sex) and professional (e.g., years of work, category of employee, and employment status) characteristics of the teachers.

Stress Questionnaire for Academic Staff (SQAS; Gomes, 2010). This instrument evaluated the sources of stress that teachers faced in their activities, including 32 items distributed across the following eight stress dimensions: (a) students' lack of motivation (e.g., "Students have little motivation to work"); (b) work overload (e.g., "Lack of time to perform all of my activities"); (c) paperwork and administrative tasks (e.g., "Diversity of administrative tasks"); (d) career progression (e.g., "Lack of opportunities for career development"); (e) relationships at work (e.g., "My colleagues have negative attitudes and behaviours"); (f) poor working conditions (e.g., "Scarcity of resources to perform my job"); (g) scientific productivity (e.g., "Publish in journals that have an international impact"); and (h) home-work interface (e.g., "Lack of time to be with family/friends"). The items were measured on a 5-point Likert scale (0 = *No stress*; 4 = *High stress*). The scores on the scales were obtained by individually adding and dividing each result. Therefore, high scores on each scale indicated higher perceptions of stress. A confirmatory factor analysis for the eight

correlated factors did not reveal a good fit ($\chi^2(436 \text{ df}) = 1221.7, p < 0.001$; RMSEA = 0.07; CFI = 0.88; NFI = 0.83; TLI = 0.88). Following indications from the modifications indices, a better and simpler data structure was obtained with the same eight correlated factors but with only three items per factor ($\chi^2(223 \text{ df}) = 491.82, p < 0.001$; RMSEA = 0.06; CFI = 0.94; NFI = 0.90; TLI = 0.93).

Cognitive Appraisal Scale (CAS; Gomes, 2008). This instrument evaluated primary and secondary cognitive appraisals. Primary cognitive appraisal was assessed with the following three dimensions: (a) work importance (e.g., “My job... means nothing to me/means a lot to me”); (b) threat perception (e.g., “My job... is not disturbing to me/is disturbing to me”); and (c) challenge perception (e.g., “My job... is not exciting for me/is exciting for me”). Secondary cognitive appraisal was assessed with the following two dimensions: (d) coping potential (e.g., “To what extent do you think you are prepared to handle the demands of your job?”); and (e) control perception (e.g., “To what extent do you feel that what happens in your job depends on you?”). The items were measured on a 7-point Likert scale, with the response scale adapted for each question (e.g., 0 = *Not at all important to me*/6 = *Very important to me* for work importance; 0 = *Not at all prepared*/6 = *Well prepared* for coping potential). The scores on the scales were obtained by individually adding and dividing each result. Therefore, high scores on each scale indicated higher perceptions of work importance, threat and challenge perceptions, coping potential, and control perception. A confirmatory factor analysis revealed that the hypothesised correlated five-factor structure fitted well with the data ($\chi^2(80 \text{ df}) = 170.8, p < 0.001$; RMSEA = 0.06; CFI = 0.98; NFI = 0.95; TLI = 0.97).

Maslach Burnout Inventory–Educators Survey (MBI-ES) (Maslach, Jackson, & Schwab, 1996). This questionnaire includes 22 items divided into the following three subscales: (a) emotional exhaustion (e.g., “I feel emotionally drained from my work”); (b) depersonalisation (e.g., “I feel that I treat some students as if they were impersonal objects”);

and (c) personal accomplishment (e.g., “I have accomplished many worthwhile things with this job”). Copyright duties were paid to CPP, Inc. to use this instrument in the current study. The items were measured on a 7-point Likert scale (0 = *never*; 6 = *every day*). The scores on the scales were obtained by individually adding each result. Therefore, high scores on emotional exhaustion and depersonalisation and low scores on the personal accomplishment scale were indicative of burnout. A confirmatory factor analysis for the three correlated factors did not reveal a good fit ($\chi^2(206\ df) = 992.2, p < 0.001$; RMSEA = 0.11; CFI = 0.76; NFI = 0.72; TLI = 0.73). Following indications from the modifications indices, a better and simpler data structure was obtained with the same three correlated factors but with only three items per factor ($\chi^2(22\ df) = 33.1, p < 0.01$; RMSEA = 0.04; CFI = 0.98; NFI = 0.97; TLI = 0.98).

The Cronbach’s alpha values were analysed for the final structures of each instrument with acceptable values observed for all of the subscales (see Table 1).

Analysis

Structural equation modelling was used to test the hypotheses. All analyses were conducted in AMOS 20.

To assess model fit, we used the χ^2 goodness-of-fit statistic, the root mean square error of approximation (RMSEA, Steiger, 1990), the Tucker-Lewis index (TLI, Tucker & Lewis, 1973), the Normed Fit Index (NFI, Bentler, 1990), and the comparative fit index (CFI, Bentler, 1990). The cut-off criteria used in this study followed generally accepted indices in recent literature, namely: RMSEA values $< .05$ indicate excellent fit and values $\geq .08$ indicate acceptable fit; TLI values greater than .90 indicate acceptable fit; NFI values greater than 0.95 indicate excellent fit and values $\geq .90$ indicate good fit; and CFI values close to .95 indicate excellent fit and values $> .90$ indicate good fit (Bentler, 2007; Chen, Curran, Bollen,

Kirby, & Paxton, 2008; Fan & Sivo, 2007). Finally, the bootstrap procedure of AMOS was used to obtain 95% confidence intervals around the parameter estimates (MacKinnon, Fairchild, & Fritz, 2007). Bootstrapping is considered a powerful resampling method for obtaining parameter estimates and confidence intervals when the variables are not assumed to be normally distributed.

Results

Relationships between the variables

The means, standard deviations and Spearman correlations between the variables are presented in Table 1. Regarding the mean values of the SQAS instrument, the three main sources of stress (values above 3.00 on the Likert scale) were work overload, the need to increase scientific productivity, and the home-work interface. For the CAS instrument, the values for challenge perception were greater than those for threat perception, and coping potential had greater values than control perception. For the MBI-ES instrument, personal accomplishment had the highest values, followed by emotional exhaustion and depersonalisation, which had lowest values. With regard to the correlations, the values between the variables had an acceptable magnitude. The correlations between the stress dimensions had the expected relations, with all of them being positive. Additionally, stress was positively related to threat perception and negatively related to challenge perception, coping potential, and control perception. Moreover, stress was positively related to emotional exhaustion and depersonalisation and negatively related to personal accomplishment. It is important to note that threat perception was positively related to emotional exhaustion and depersonalisation and negatively related to personal accomplishment. In contrast, challenge

perception, coping potential, and control perception were all negatively related to emotional exhaustion and depersonalisation and positively related to personal accomplishment.

Table 1. Means, standard deviations, alpha values, and correlations between stress (SQAS), cognitive appraisal (CAS), and burnout (MBI-ES)

Variables	M (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Students' lack of motivation	2.54 (.93)	(.91)														
2. Work overload	3.31 (.63)	.31**	(.70)													
3. Paperwork and administrative tasks	2.98 (.77)	.32**	.42**	(.82)												
4. Career progression	2.70 (.93)	.50**	.41**	.44**	(.80)											
5. Relationships at work	2.22 (.86)	.45**	.32**	.35**	.54**	(.74)										
6. Poor working conditions	2.14 (.93)	.44**	.13*	.27**	.39**	.46**	(.76)									
7. Scientific productivity	3.23 (.78)	.47**	.55**	.26**	.49**	.31**	.19*	(.86)								
8. Home-work interface	3.08 (.79)	.24**	.49**	.36**	.34**	.28**	.18**	.40**	(.86)							
9. Threat perception	2.43 (1.23)	.03	.22**	.19**	.27**	.31**	.17**	.29**	.29**	(.83)						
10. Challenge perception	4.37 (.98)	-.22**	-.06	-.07	-.23**	-.21**	-.26**	-.16**	-.25**	-.29**	(.93)					
11. Coping potential	4.14 (.87)	-.30**	-.14*	.02	-.26**	-.22**	-.33**	-.23**	-.26**	-.22**	.52**	(.90)				
12. Control perception	3.60 (1.00)	-.21**	-.26**	-.07**	-.43**	-.29**	-.22**	-.30**	-.18**	-.25**	.44**	.51**	(.84)			
13 Emotional exhaustion	8.62 (4.78)	.12**	.39**	.22**	.31**	.35**	.16**	.33**	.38**	.37**	-.25**	-.29**	-.34**	(.88)		
14. Depersonalisation	3.11 (3.37)	.24**	.13*	.04	.21**	.31**	.20**	.09	.08	.21**	-.21**	-.19**	-.19**	.38**	(.71)	
15. Personal accomplishment	10.90 (3.92)	-.23**	-.05	.06	-.08	-.11*	-.03	-.19**	-.04	-.12*	.18**	.27**	.14*	.09	-.21**	(.70)

Note: alpha values are presented in parentheses

* $p < .05$; ** $p < .01$

Stress, cognitive appraisal, and burnout: Preliminary analysis

Three aspects were considered before testing the relation between stress, cognitive appraisal, and burnout. First, data were screened for univariate and multivariate outliers using the protocol described by Tabachnick and Fidell (2007). This led to the removal of fourteen participants, leaving a total sample for the next group of analysis of 319 participants.

Second, the work importance dimension from the CAS subscale was used to scrutinise participants who attributed little or no importance to their work. In fact, if the condition of giving importance to a situation does not occur then this situation can be, for example, frustrating or sad for the individual but it does not represent a stressful event that implies efforts of adaptation. Therefore, maintaining participants who attributed low importance to their work did not make sense as this study tested the relationship between stress, cognitive appraisal, and burnout. Thus, a cut-off criterion was established such that participants with values that were less than or equal to two points on the Likert scale of the work importance dimension were removed from the database.

Third, the number of manifest variables in the analysis regarding the stress and burnout dimensions was reduced to simplify the models tested. The possibility that there was a single latent variable for the stress and burnout dimensions was investigated. This option was preferable for several reasons, including an increase in factor reliability, an increase in the possibility that factors would be normally distributed, a decrease in idiosyncratic variance, and a decrease in the ratio of measured variables to subjects (Marsh, Richards, Johnson, Roche, & Tremayne, 1994). For the stress dimensions, a confirmatory factor analysis revealed a good fit ($\chi^2(236 \text{ df}) = 439.45, p < 0.001$; RMSEA = 0.052; CFI = 0.95; NFI = 0.90; TLI = 0.94). For the burnout dimensions, a confirmatory factor analysis also revealed a good fit ($\chi^2(22 \text{ df}) = 35.8, p < 0.05$; RMSEA = 0.04; CFI = 0.99; NFI = 0.97; TLI = 0.98).

These two dimensions were tested for validation and then used to test the structural models. This two-step approach followed the recommendation of Anderson and Gerbing (1988), who argued that the first step should test the construct validity of the measurement models, and the second step should test the structural models.

Measurement models

With regard to Model 1, which tested the relation between stress, primary cognitive appraisal, and burnout, the fit of the 1-factor model with all of the items from the thirteen study variables loading onto a single latent variable was compared with that of a 4-factor model that included stress, threat perception, challenge perception, and burnout. The 4-factor model fitted well to the data, $\chi^2(616\ df) = 999.7, p < 0.01$; RMSEA = 0.044 ($p_{\text{close}} = 0.972$); CFI = 0.94; NFI = 0.90; TLI = 0.93, and its fit was superior to that of the 1-factor model ($\Delta\chi^2(80\ df) = 3752.7; p < 0.001$) All of the standardised factor loadings were significant, ranging from 0.23 to 0.85. These results confirmed the validity of the 4-factor specified measurement model.

With regard to Model 2, which tested the relation between stress, secondary cognitive appraisal, and burnout, the fit of the 1-factor model with all of the items from the thirteen study variables loading onto a single latent variable was compared with that of a 4-factor model that included stress, coping potential, control perception, and burnout. The 4-factor model fitted well to the data, $\chi^2(616\ df) = 970.8, p < 0.01$; RMSEA = 0.043 ($p_{\text{close}} = 0.993$); CFI = 0.95; NFI = 0.90; TLI = 0.94, and its fit was superior to that of the 1-factor model ($\Delta\chi^2(80\ df) = 3499.0, p < 0.001$). All of the standardised factor loadings were significant, ranging from 0.23 to 0.86. These results supported the validity of our specified measurement model.

Testing the structural models

To test the structural models, the fit of a mediated model was compared to the fit of a direct model. The mediated model established a relation between stress, cognitive appraisal, and burnout, whereas the direct model established a relation from stress and cognitive appraisal to burnout. Additionally, we analysed which type of mediation (e.g., partial or full) best explained the data. In the partial mediation model, we added direct paths from stress to cognitive appraisal, whereas, in the full mediation model, we removed the direct paths from stress to burnout.

Model 1 tested the relation between stress, primary cognitive appraisal (e.g., threat perception and challenge perception), and burnout. Thus, the mediated model established a relationship between stress, threat perception, challenge perception, and burnout. The direct model established a relationship between stress, threat perception, and challenge perception to burnout. The partially mediated model added direct paths from stress to threat perception and challenge perception. Finally, the fully mediated model assumed no direct paths from stress to burnout. The fit indices of the three structural models are presented in Table 2. The direct effects model did not fit the data successfully. The RMSEA (0.057) deviated significantly from 0.50 ($p_{\text{close}} < 0.01$). The fully mediated model showed acceptable fit indices (RMSEA = 0.056, CFI = 0.90, TLI = 0.89), but the partially mediated model, which included all of the direct and indirect effects, appeared to have the best fit indices (RMSEA = 0.054 ($p_{\text{close}} = 0.053$); CFI = 0.91; TLI = 0.90). The difference in chi-squares between the fully and partially mediated models was significant ($\Delta\chi^2(1) = 42.55$; $p < 0.001$), indicating that the direct effects should not be ignored.

Table 3 presents the standardised effects for the partially mediated version of Model 1, namely the parameter estimates of the structural paths' coefficients and the squared multiple correlation coefficients. The estimates of the direct and indirect effects were based on 1,000

bootstrap samples. The corresponding 95% confidence intervals for these bootstrap estimates are presented in parenthesis. The partially mediated model explained 15% of the variance associated with threat perception and 12% of the variance associated with challenge perception. Additionally, this model explained 69% of the variance in burnout experience. In this way, stress was positively related with burnout both directly (hypothesis 1) and indirectly (hypothesis 6), as confirmed by the partially mediated effect of primary cognitive appraisal on the relation between stress and burnout. As predicted, occupational stress was related to primary cognitive appraisal both positively (e.g., threat perception) and negatively (e.g., challenge perception) (hypothesis 2). Primary cognitive appraisal was positively (e.g., threat perception) and negatively (e.g., challenge perception) related to burnout (hypothesis 4). It should be noted that the impact of stress on threat and challenge perceptions was of a similar magnitude. This is also evident for the impact of threat and challenge perceptions on burnout.

Model 2 tested the relationship between stress, secondary cognitive appraisal (e.g., coping potential and control perception), and burnout. The mediated model established a relationship between stress, coping potential, control perception, and burnout. The direct model established a relationship from stress, coping potential, and control perception to burnout. The partially mediated model added direct paths from stress to coping potential and control perception. Finally, the fully mediated model assumed no direct paths from stress to burnout. The fit indices of the three structural models are presented in Table 2. The direct effects model did not fit the data successfully. The RMSEA (0.056) deviated significantly from 0.50 ($p_{\text{close}} < 0.01$). The fully mediated model showed acceptable fit indices (RMSEA = 0.053, CFI = 0.91, TLI = 0.90). However, the partially mediated model, which included all of the direct and indirect effects, appeared to have the best fit indices (RMSEA = 0.052 ($p_{\text{close}} = 0.25$); CFI = 0.94; TLI = 0.91). The difference in chi-squares between the fully and partially

mediated models was significant ($\Delta\chi^2(1) = 33.1; p < 0.001$), indicating that the direct effects should not be ignored.

Table 3 presents the standardised effects for the partially mediated version of Model 2, namely the parameter estimates of the structural paths' coefficients and the squared multiple correlation coefficients. The estimates of the direct and indirect effects were based on 1,000 bootstrap samples, with the corresponding 95% confidence intervals of these bootstrap estimates presented in parenthesis. The partially mediated model explained 17% of the variance associated with coping potential and 22% of the variance associated with control perception. Additionally, this model explained 50% of the variance in burnout experience. In this way, stress was positively related burnout both directly (hypothesis 1) and indirectly (hypothesis 7), as confirmed by the partially mediated effect of secondary cognitive appraisal on the relationship between stress and burnout. As predicted, occupational stress was negatively related to secondary cognitive appraisal (e.g., coping potential and control perception) (hypothesis 3). Additionally, secondary cognitive appraisal (e.g., coping potential and control perception) was negatively related to burnout (hypothesis 5). It should be noted that the impact of stress on coping potential and control perception was of a similar magnitude. This is also evident for the impact of coping potential and control perception on burnout.

Table 2. Models 1 and 2: Fit indices for the three structural models

	χ^2/p	RMSEA	<i>P</i> -close	CFI	TLI
Model 1					
1. Direct effects	2.030	0.057	0.005	0.89	0.89
2. Full mediation	1.989	0.056	0.015	0.90	0.89
3. Partial mediation	1.938	0.054	0.053	0.91	0.90
Model 2					
1. Direct effects	1.993	0.056	0.014	0.90	0.89
2. Full mediation	1.898	0.053	0.120	0.91	0.90
3. Partial mediation	1.852	0.052	0.254	0.91	0.91

Table 3. Standardised effects (95% confidence intervals) for partial mediation Models 1 and 2

Model 1	Dependent variables			
	Primary cognitive appraisal		Burnout	
	Threat perception	Challenge perception	Indirect effect	Direct effect
Stress	0.382** (0.267; 0.490)	-0.350** (-0.456; -0.239)	0.212** (0.126; 0.330)	0.524** (0.339; 0.696)
Threat perception				0.339** (0.153; 0.497)
Challenge perception				-0.237** (-0.401; -0.056)
R^2	0.15** (0.071; 0.240)	0.12** (0.057; 0.208)		0.69** (0.455; 0.990)
<hr/>				
Model 2	Dependent variables			
	Secondary cognitive appraisal		Burnout	
	Coping potential	Control perception	Indirect effect	Direct effect
Stress	-0.406** (-0.525; -0.295)	-0.466** (-0.574; -0.367)	0.206** (0.133; 0.314)	0.430** (0.245; 0.586)
Coping potential				-0.284** (-0.414; -0.101)
Control perception				-0.195** (-0.392; -0.040)
R^2	0.17** (0.087; 0.276)	0.22** (0.134; 0.329)		0.50** (0.343; 0.684)

Note: confidence intervals are presented in parentheses

** $p < .01$

Discussion

The last two decades have resulted in significant changes in the professional activity of college teachers (Catano et al., 2010). They used to have careers that were considered low stress, secure, and safe, with opportunities to perform satisfying and autonomous work. This situation has changed drastically with a significant increase of occupational stress in this activity (Willie & Stecklein, 1982). Although the analysis of participants' sources of stress was not a central goal of this study, it should be noted that the main factors that contributed to

an augment in stress were related to work overload, the need to increase scientific productivity, and the home-work interface, which confirmed the scenario that teachers experience high levels of stress and multiple sources of stressors. It is interesting that all of these factors are related because the accumulating number of teacher duties (e.g., writing more papers, increasing the quality of the papers submitted for publication, looking for financial support, etc.) may promote the perception of a high workload, which may make it difficult to manage professional and personal roles. Research has confirmed the importance of these factors, including the work overload (Winefield & Jarrett, 2001), the pressures to publish (Fisher, 1994), the insufficient funding and resources (Gillespie, Walsh, Winefield, Dua, & Stough, 2001), and the impact of stress on personal, family, and social relations (Boyd & Wylie, 1994).

Despite the interest in learning about the stress caused by teachers' activities and the consequences of this stress on their well-being, it is crucial to understand what factors explain why some teachers seem to overcome difficulties with no apparent negative consequences, whereas others tend to react in a more dysfunctional way. This was the main goal of the current study, which proposed analyses of cognitive appraisal processes according to the transactional model of Lazarus (1991; Lazarus & Folkman, 1984) to explain human adaptation to occupational stress. The result of this analysis was the formulation of seven hypotheses.

The first hypothesis tested the traditional relation between stress and strain, which proposes that occupational stress is positively related to burnout. This hypothesis was confirmed for both models. Additionally, when mediation was tested through the introduction of cognitive appraisal, stress maintained a significant relation with burnout. These results are in accordance with previous findings that demonstrate the relationship between teachers' exposure to stress and the resulting strain, including somatic complaints (Shirom, Oliver, &

Stein, 2009). This pattern of results is also in accordance with theoretical proposals, including Demand–Control theory (Karasek & Theorell, 1990), which argues that job demands (or stressors) have a main direct effect on both psychological and physiological strain. Moreover, Ortqvist and Wincent (2006) found support for the relationship between stress and strain in a review of cross-sectional studies. Thus, our study demonstrates that this set of relations between stress and strain could extend to the relation between stress and burnout.

With regard to the relations between stress and cognitive appraisal (hypotheses 2 and 3), the results confirmed both assumptions, such that stress was positively related to threat perception and negatively related to challenge perception. Stress was also negatively related to coping potential and control perception. This pattern of results is in accordance with the differential effects of stress on both cognitive processes (Lazarus, 1991) and the relationship between stress and control perception (Hobfoll & Shirom, 2000; Karasek & Theorell, 1990). Research has demonstrated that the concept of challenge is associated with positive benefits, such as intrinsic motivation (Deci & Ryan, 1985) and peak experiences during performances (Csikszentmihalyi, 1988). With regard to the relationship between stress and coping, there is evidence that lower levels of occupational stress are related to the use of coping strategies that focus on problem solving (which may promote coping potential), such as active coping and positive appraisals of work (Brenner, Sorbom, & Wallius, 1985; Needle, Griffen, & Svendsen, 1981). In contrast, feelings of distress are related to the use of less desirable coping strategies (which may not promote coping potential), such as avoiding problems (Chan, 1998). In this case, Mearns and Cain (2003) studied primary and secondary teachers and found that stress was positively related to a reliance on maladaptive coping and intense experiences of burnout and distress.

With regard to the relationship between cognitive appraisal and burnout (hypotheses 4 and 5), the results were as predicted: threat perception was positively related to burnout,

whereas challenge perception, coping potential, and control perception were negatively related to burnout. This finding highlights the importance of analysing the processes of cognitive appraisal (Lazarus, 1991) when explaining the relationship between stress, strain, and teachers' work experiences.

The final two hypotheses constituted the main goal of this study, which was to test the mediating effect of cognitive appraisal on the relationship between stress and burnout. There is a lack of research examining the impact of cognitive appraisal on the relationship between stressful events and burnout, and a number of theoretical proposals regarding this topic lack empirical support (Skinner & Brewer, 2004). The results of the current study partially confirmed the impact of primary and secondary cognitive appraisals on the relationship between stress and burnout. Thus, processes of cognitive appraisal are important factors when explaining the relationship between stress and burnout. This result is in line with research indicating the importance of observing factors that either ameliorate or aggravate the impact of occupational stress on individuals. For example, Chan's (1998) study of teachers in Hong Kong concluded that the types of coping strategies used by teachers mediated the effects of stress on their emotional well-being. More importantly, job stress did not produce negative effects for all of the individuals, leaving open the question of which characteristics protect some teachers against the ravages of occupational stress, whereas others remain vulnerable (Mearns & Cain, 2003). However, it is also evident that in our study stress maintains an effect on burnout even when the mediating influence of cognitive appraisal is tested.

In summary, this study has the advantage of including the processes of primary and secondary cognitive appraisals in the examination of the relation between stress and burnout, which overcomes the limitation of studying human adaptation to work contexts using the stress-strain approach. The stress-strain approach tends to simplify a phenomenon that is dynamic and individualised. Despite this study's advantages, some limitations should be

addressed. First, stress and burnout were conceptualised in a unidirectional manner, meaning that burnout was considered a consequence of work-related stress (Maslach et al., 2001). As stated in the introduction, a number of major theoretical proposals were adopted to establish this relationship between stress, cognitive appraisal, and burnout. However, there is evidence that stress and burnout may be related in a bidirectional manner over time (de Jonge et al., 2001; de Lange, Taris, Kompier, Houtman, & Bongers, 2004; Shirom et al., 2009). Thus, it is important to test these relationships in future research with a longitudinal methodology instead of using a cross-sectional design (as was the case of this study) in order to observe whether the processes of cognitive appraisal interfere in the relation between stress and burnout across different time periods. Second, stress, appraisal, emotions, and coping should be analysed. According to Lazarus and Cohen-Charash (2001), research regarding stress and emotions has developed along two separate lines, which is illogical and counterproductive. In fact, both phenomena are interdependent and should be analysed together as a single topic given that stress generates emotional consequences and emotion encompasses all of the process of stress. Although it would be difficult to examine all of these factors in a single study, future research should assume this challenge because it is the only way to capture the dynamic process of adaptation to stressful situations. Finally, this study used a convenience sample that does not represent Portuguese teachers and the response rate was not very high (37.3%) which can increase the probability of statistical biases (Tomaskovic-Devey et al., 1994). However, this value is similar or even higher to those reported in other studies using similar group of participants (for a review, see Catano et al., 2010). In our case, the reason for not responding can be related with the main source of stress experienced by teachers (e.g., work overload), being difficult to find some extra time to complete the evaluation protocol.

From a practical point of view, it is evident that an intervention on occupational stress should consider both the characteristics of the work context and the individual. This double

target of intervention is justified given that stress was related to teachers' burnout experiences even when the mediating influence of cognitive appraisal was taken into consideration. Thus, it is important to design interventions that promote productive and efficient work contexts and that do not instigate burnout among individuals. Additionally, it is important to design interventions directed to help individuals perceive their activities as more challenging than threatening by training them to use adequate coping strategies and promoting their sense of control over their work.

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